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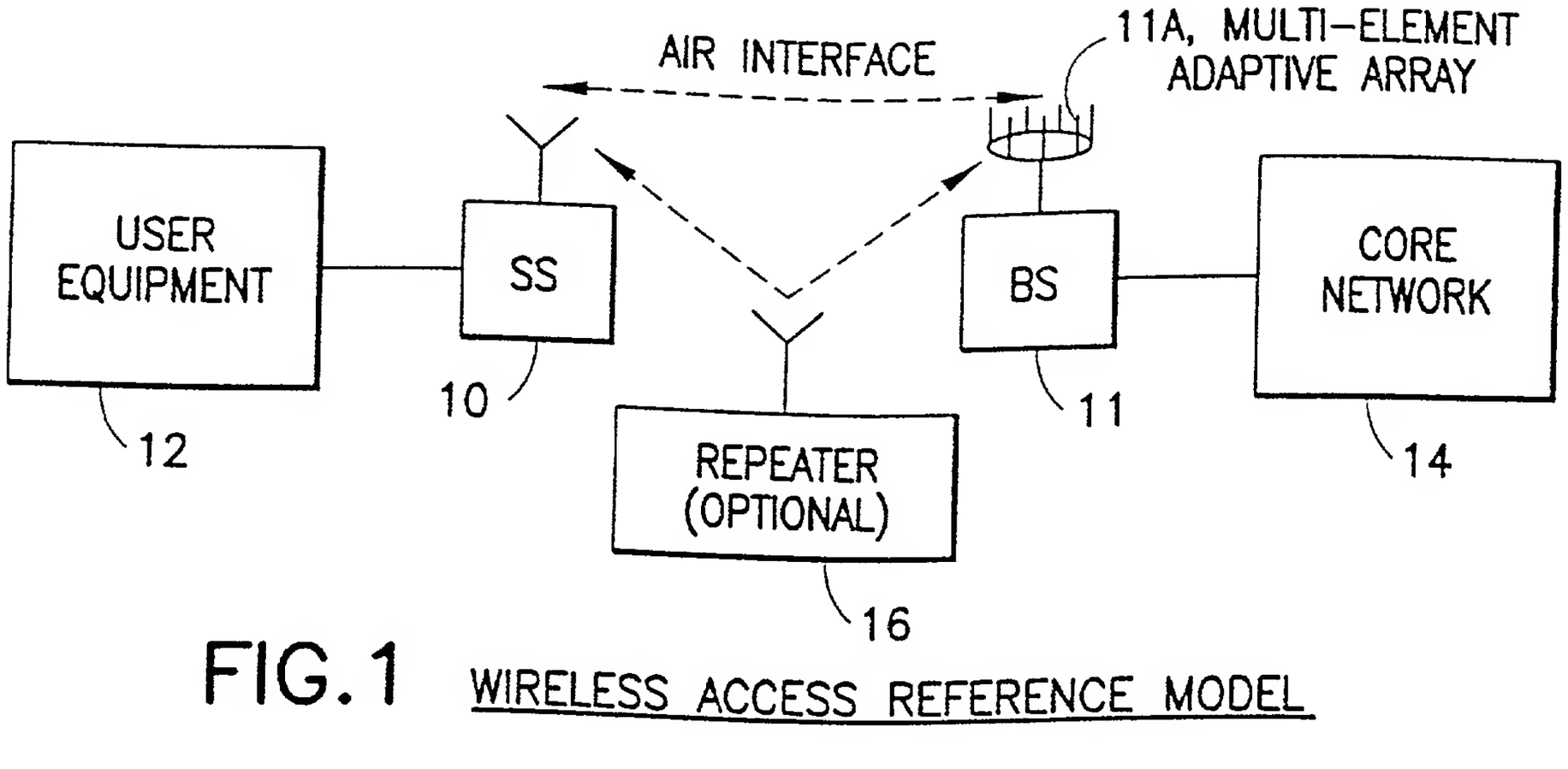


FIG.1 WIRELESS ACCESS REFERENCE MODEL

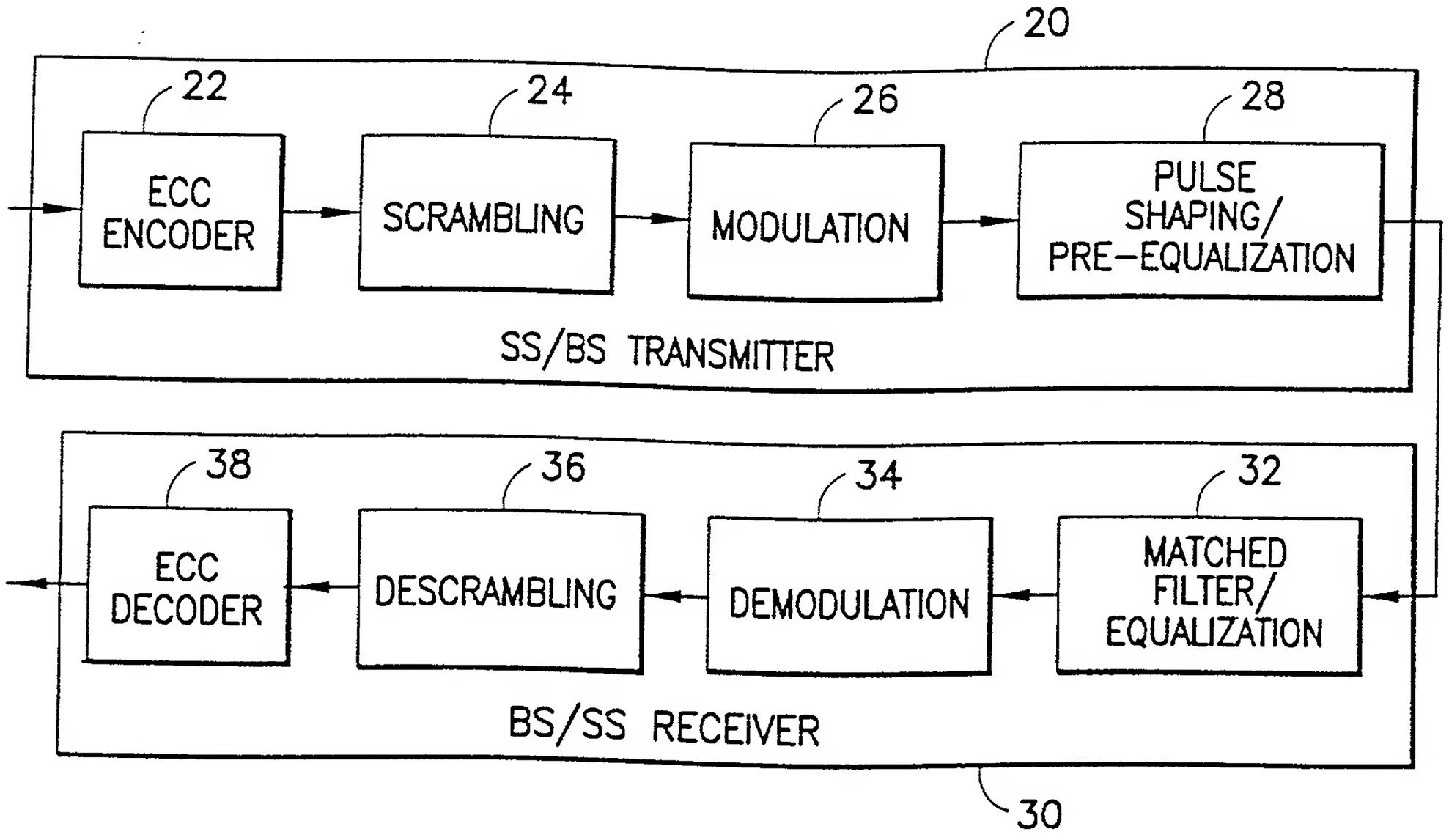


FIG.2 PHY REFERENCE MODEL SHOWING DATA FLOW

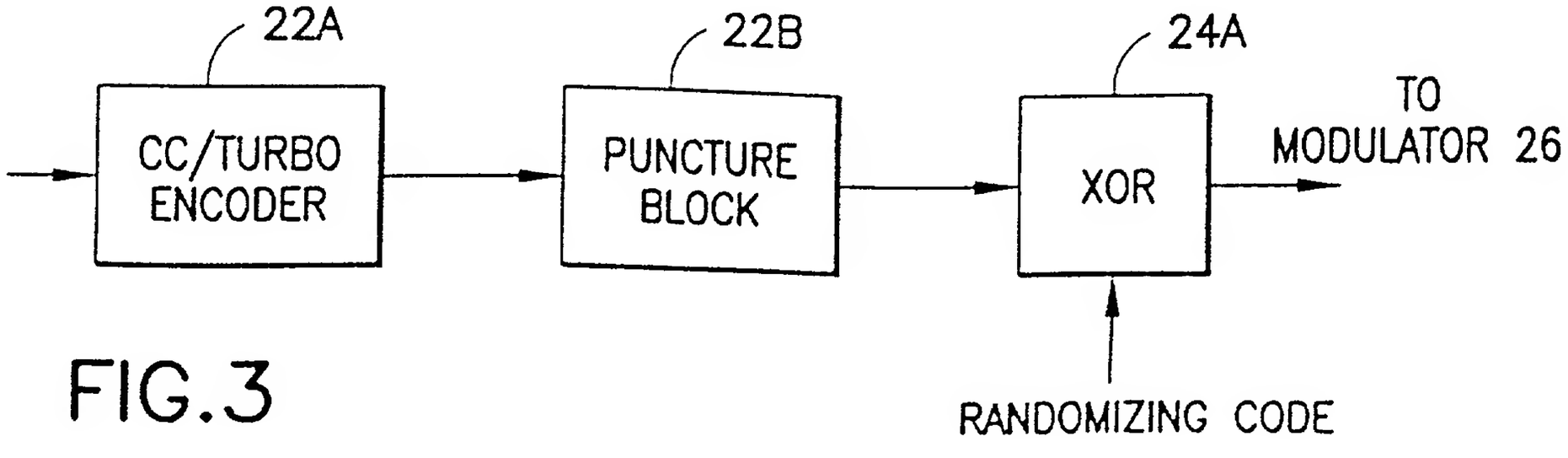


FIG.3

	MODULATION AND CHANNEL CODING		
PARAMETER	QPSK w/R=4/5 CODING (1.6 BITS/SYM)	16-QAM w/R=4/5 CODING (3.2 BITS/SYM)	64-QAM w/R=4/5 CODING (4.8 BITS/SYM)
RF CHANNEL BANDWIDTH	3.5 MHz	3.5 MHz	3.5 MHz
CHIP RATE	2.56 Mcps	2.56 Mcps	2.56 Mcps
COMMUNICATION CHANNEL BANDWIDTH	4.096 Mbps	8.192 Mbps	12.288 Mbps
PEAK DATA RATE	4.096 Mbps	8.192 Mbps	12.288 Mbps
CDMA CHANNEL BANDWIDTH (SF=1)	4.096 Mbps	8.192 Mbps	12.288 Mbps
CDMA CHANNEL BANDWIDTH (SF=16)	256 kbps	512 kbps	768 kbps
CDMA CHANNEL BANDWIDTH (SF=128)	32 kbps	64 kbps	96 kbps
MODULATION FACTOR	1.17 bps/Hz	2.34 bps/Hz	3.511 bps/Hz

FIG.4 HYPOTHETICAL PARAMETERS FOR A 3.5 MHz RF CHANNELIZATION

T0h20T" 02h2E00T

	QPSK		16 QAM		64 QAM	
NUMBER OF ELEMENTS	AGGREGATE CAPACITY (Mbps)	MODULATION FACTOR	AGGREGATE CAPACITY (Mbps)	MODULATION FACTOR	AGGREGATE CAPACITY (Mbps)	MODULATION FACTOR
1	4.096	1.17	8.192	2.34	12.288	3.511
2	8.192	2.34	16.384	4.68	24.576	7.022
4	16.384	4.68	32.768	9.36	49.152	14.044
8	32.768	9.36	65.536	18.72	98.304	28.088
16	65.536	18.72	131.072	37.44	196.608	56.176

FIG.5 AGGREGATE CAPACITY AND MODULATION FACTORS VERSUS MODULATION TYPE AND ARRAY SIZE

$$\mathbf{x}_n(t) = \sum_{l=1}^{L_n} \alpha_{n,l}\mathbf{a}(\theta_{n,l})s_n(t-\tau_{n,l})$$

FIG. 6A

$$\mathbf{v}_n = \sum_{l=1}^{L_n} \alpha_{n,l}\mathbf{a}(\theta_{n,l})\exp(-j\omega_c\tau_{n,l})$$

FIG. 6B

$$\mathbf{x}(t) = \sum_{n=1}^{N} \mathbf{v}_n s_n(t) + \mathbf{n}(t)$$

FIG. 6C

$$y_n(t) = \begin{bmatrix} w_{n,1}^* & w_{n,2}^* & \cdots & w_{n,M}^* \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \\ \vdots \\ x_M(t) \end{bmatrix} = \mathbf{w}_n^H \mathbf{x}(t)$$

FIG. 6D

$$\mathbf{R}_{ii}(n) = \sum_{i=1\ i\neq n}^{N} \sigma_s^2 \mathbf{v}_i \mathbf{v}_i^H + \sigma_n^2 \mathbf{I}_M$$

FIG. 6E

$$\mathrm{SINR}_{opt} = \sigma_s^2 \mathbf{v}_n^H \mathbf{R}_{ii}^{-1}(n)\mathbf{v}_n$$

FIG. 6F

$$\hat{P}_y(i) = \sum_{n=1}^{N_t} \left|\mathbf{v}_d^H \mathbf{v}_n\right|^2 G^2\sigma_s^2 + \left|\mathbf{v}_d^H \mathbf{v}_d\right|^2 G\sigma_n^2 = G^2\sigma_s^2 \sum_{n=1}^{N_t} \rho_{d,n} + C$$

FIG. 6G

$$\mathrm{SINR}_{opt}(2) = \frac{\sigma_s^2}{\sigma_n^2}\left[\|\mathbf{v}_1\|^2 - \frac{\sigma_s^2\left|\mathbf{v}_1^H\mathbf{v}_2\right|^2}{\sigma_n^2 + \sigma_s^2\|\mathbf{v}_2\|^2}\right]$$

FIG. 6H

$$\mathrm{SINR}_{opt}(2) = \frac{\sigma_s^2}{\sigma_n^2}\left[M - \frac{\sigma_s^2\left|\mathbf{v}_1^H\mathbf{v}_2\right|^2}{\sigma_n^2 + M\sigma_s^2}\right] \approx M\frac{\sigma_s^2}{\sigma_n^2}\left[1 - \frac{\left|\mathbf{v}_1^H\mathbf{v}_2\right|^2}{M^2}\right]$$

FIG. 6I

$$\xi_d(c) = \sum_{n\in S_c}\left|\mathbf{v}_d^H\mathbf{v}_n\right|^2 = \sum_{n\in S_c}\rho_{d,n}$$

FIG. 6J

$$\hat{P}_y(i) = G^2\sigma_s^2\xi_d(c) + C$$

FIG. 6K

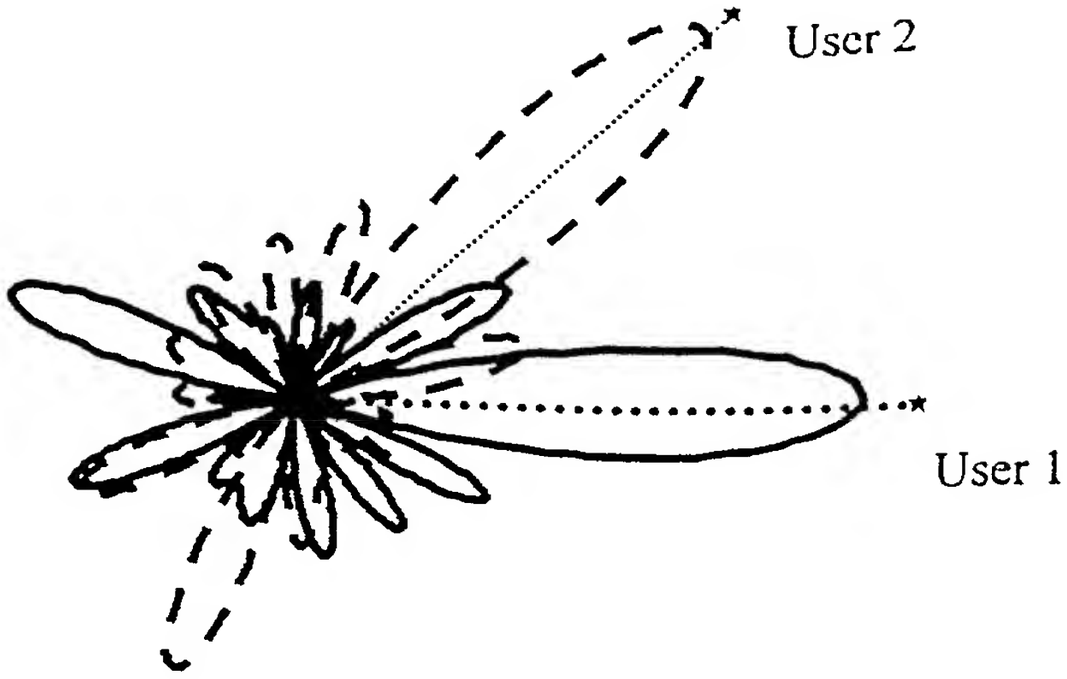
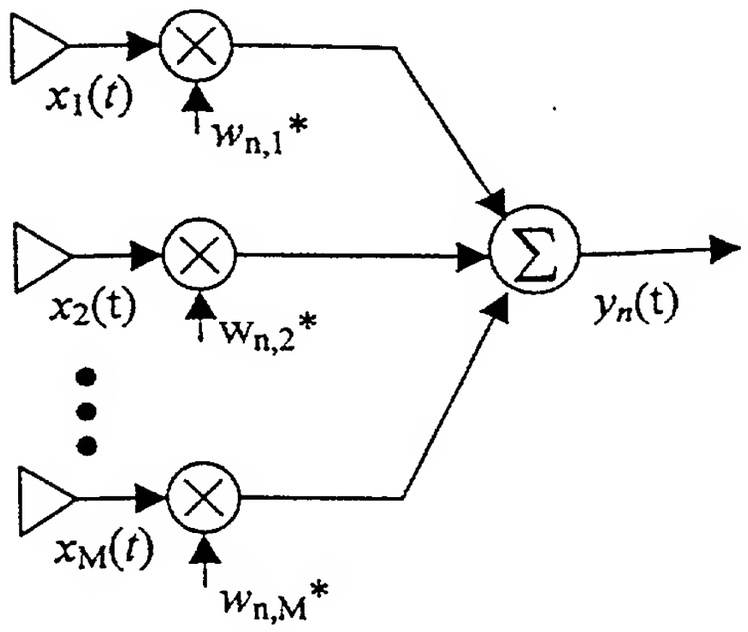


FIG. 7



SPATIAL FILTER 11B

FIG. 8

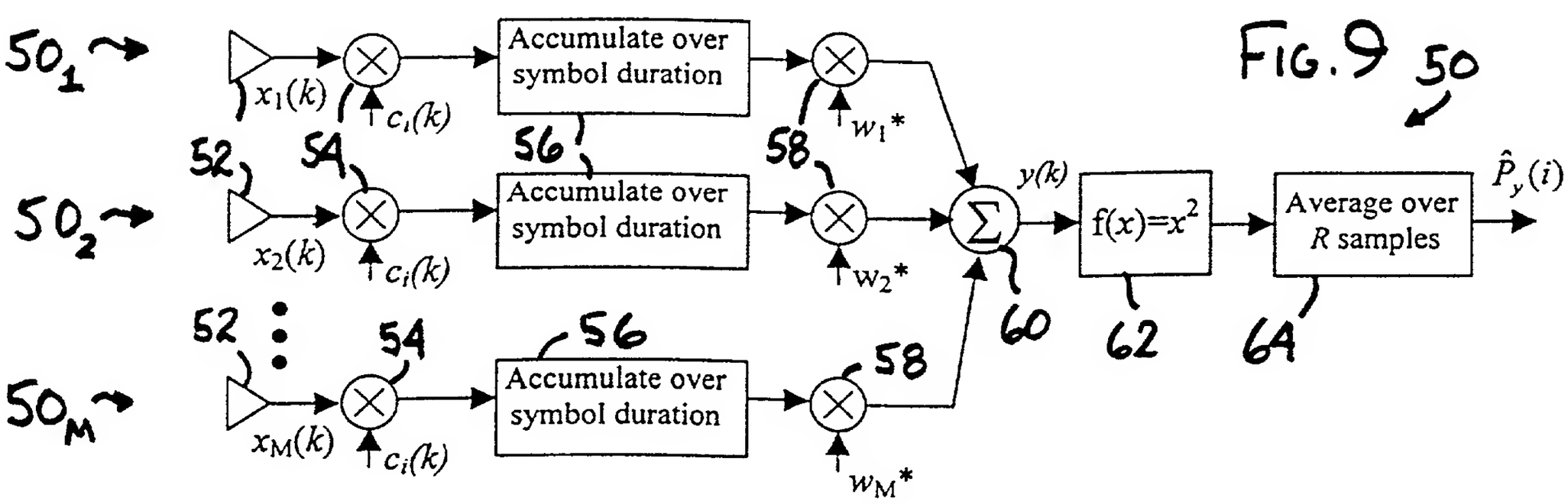


FIG. 9 50

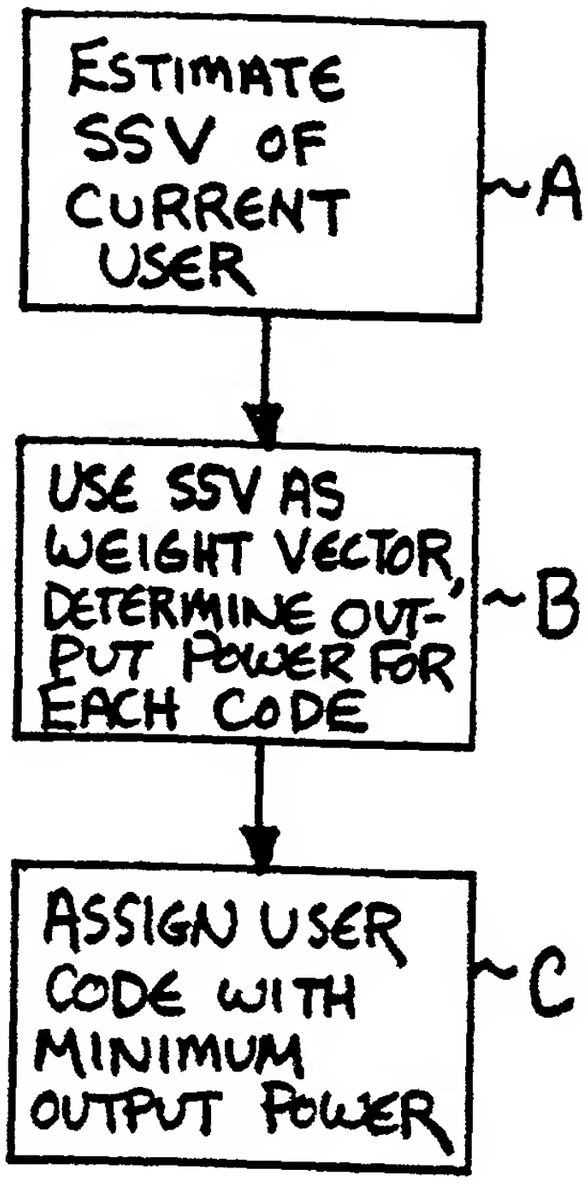

ESTIMATE SSV OF CURRENT USER
A
USE SSV AS WEIGHT VECTOR, DETERMINE OUTPUT POWER FOR EACH CODE
B
ASSIGN USER CODE WITH MINIMUM OUTPUT POWER
C

FIG. 10

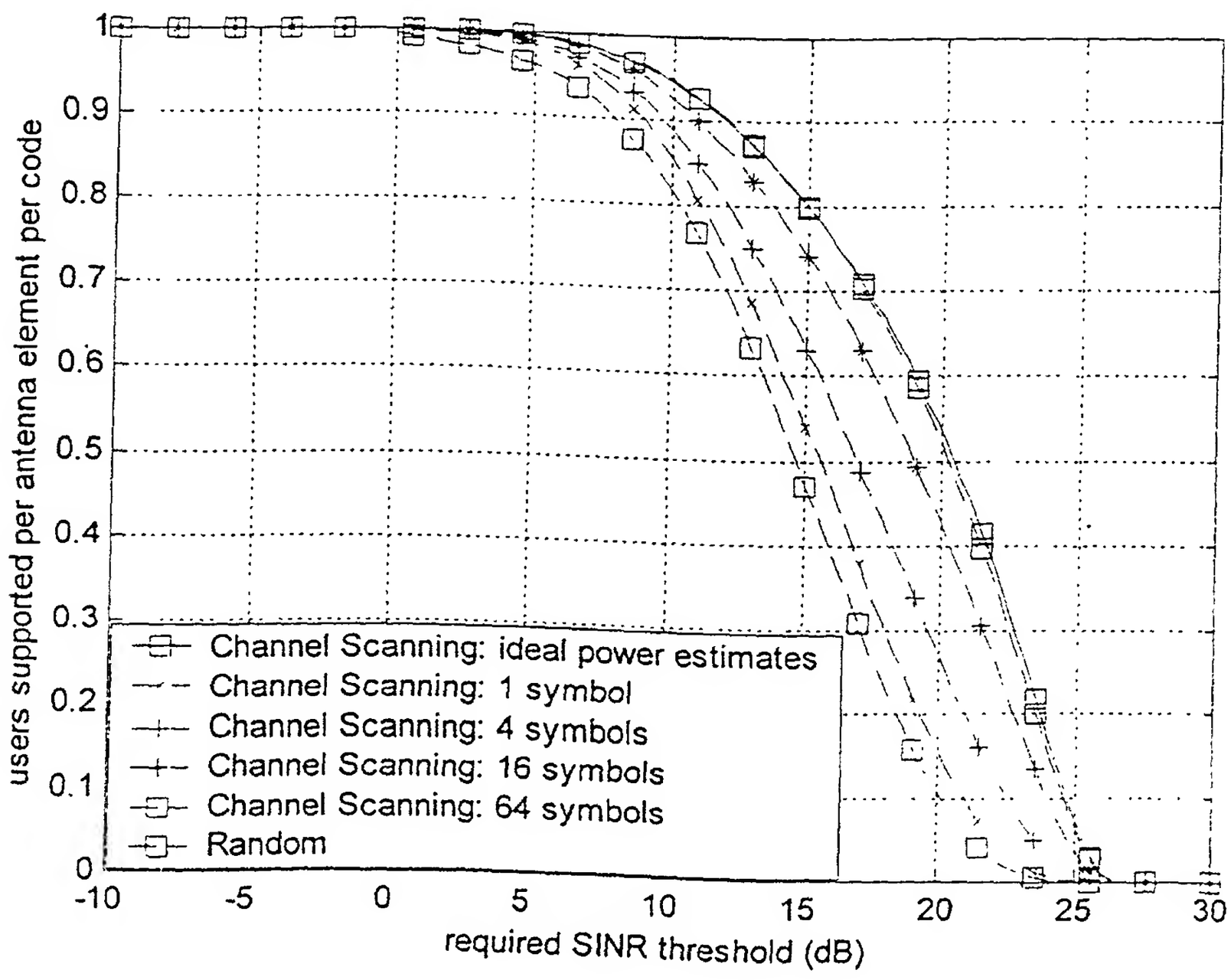

users supported per antenna element per code
required SINR threshold (dB)
Channel Scanning: ideal power estimates
Channel Scanning: 1 symbol
Channel Scanning: 4 symbols
Channel Scanning: 16 symbols
Channel Scanning: 64 symbols
Random
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-10
-5
0
5
10
15
20
25
30

FIG. 11